SPECIES AND HABITAT: WILDLIFE

Characterization

Species of Consideration[1]: Table WL-1 lists the species of consideration in the South Fork Coos Watershed and their relative abundance and distribution. For detailed discussions on wildlife species associated with late-successional habitat the reader can refer to the FEMAT (1993), FSEIS on Managing of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA; USDI 1994), and the Coos Bay District FEIS for the RMP (USDI 1994).

Except for a few of the listed Threatened/Endangered species (northern spotted owl, marbled murrelet, and bald eagle), there have been few species-specific inventories for wildlife in the Watershed. Surveys for Survey and Manage species have also been completed, but only on specific units in the Matrix. Inventories on vegetation associations have not been conducted, and thus information on wildlife/habitat relationships is also lacking.

There are 228 wildlife species known or suspected to occur in the South Fork Coos Watershed. This list includes 15 amphibians, 15 reptiles, 141 birds and 57 mammals. Thirty-four of the 228 wildlife species are Special Status Species (WL Appendix - E: Vertebrate Wildlife Species List). Other species have additional status under the Northwest Forest Plan (NWFP) (USDA; USDI 1994) as Survey and Manage Species or Protection Buffer Species.

Wildlife species that occur in the Watershed are associated with a variety of habitat types. These include large rivers, streams, ponds, wetlands, riparian forest, meadow, shrub communities, talus, conifer forest, hardwood forest and mixed conifer-hardwood forest. Most of the Watershed is privately owned (Table Intro-1) and is primarily industrial forest land. Only about 20% of the South Fork Coos Watershed is in Federal ownership (Table Intro-1). Approximately 64% of the BLM land in the Watershed is in LSR #261 and this is where most of the late-successional forest habitat occurs.

Current Conditions

Table WL-1 lists the habitat characteristics by species, and how these are distributed. Key habitat characteristics for this analysis area include: riparian areas, snags, coarse down wood, and late-successional forest. Refer to Table WL-1 for ratings of the Current Habitat Condition and Trend for the species of consideration. Map Wild-1: Timber Age Classes - Wildlife Emphasis shows BLM stands in the Watershed.

[1] The phrase "species of consideration" is used to refer to the group of species for which special management consideration exists in the analysis area, consistent with the use in Watershed Analysis Guide Ver. 2.2 (REO 1995), and is not to be confused with the species of concern list maintained by the U.S. Fish and Wildlife Service which is roughly analogous to the former Federal Candidate 2 species list.

Table WL-1

Common/Latin Name	Species: Presence[1]	Status Federal[2]	Status State[3]	Relative Abundance	Distribution[4]	Habitat Characteristics: Special Habitats: Cliff(C) Talus (T)	Snags/ CWM	Riparian/ Wetland	Hardwood Forest	Seral Stages: Early	Mid	Late	Mature	Old-Growth	Current Conditions: Habitat Distribution	Habitat Condition[5]	Habitat Trend[6]
AMPHIBIANS - Aquatic																	
Southern Torrent Salamander *Rhyacotriton variegatus*	K	J2 BT	SSC	Rare	L		CWM	X							Cold Streams Aquatic	F	I
Tailed Frog *Ascaphus truei*	S	J2 BA	SSV	Rare	W		CWM	X			X	X	X	X	Cold Streams Aquatic	F	I
Red-Legged Frog *Rana aurora*	K	BS	SSU	Uncommon	W			X	X						Riparian Patchy	F	I
Foothill Yellow-legged Frog *Rana boylii*	S	BS	SSV	Uncommon	W			X							Riparian Patchy	F	I
-Terrestrial																	
Clouded Salamander *Aneides ferreus*	S	BT	SSU	Rare	W		CWM		X	X	X	X			CWM Patchy	P	I
BIRDS																	
Northern Spotted Owl *Strix occidentalis caurina*	K	FT	ST	Rare	W		S						X	X	OG Patchy	F	S
Marbled Murrelet *Brachyramphus marmoratus marmoratus*	K	FT	ST	Rare	W									X	OG Patchy	F	S
Bald Eagle *Haliaeetus leucocephalus*	K	FT	ST	Uncommon	W		S	X						X	Nest Tree Patchy	F	S
American Peregrine Falcon *Falco peregrinus anatum*	S	FE	SE	Rare	W	C		X	X						Cliff Patchy	F	S
Northern Goshawk *Accipiter gentilis*	S	BS	SSC	Rare	W								X	X	OG Patchy	P	S
Pileated Woodpecker *Dryocopus pileatus*	K	BA	SSV	Uncommon	W		S	X						X	Snag/OG Patchy	F	I
Northern Pygmy-Owl *Glaucidium gnoma*	K	BT	SSU	Uncommon	W		S						X	X	Snags Patchy	F	I
MAMMALS																	
Big Brown Bat *Eptesicus fuscus*	S			Common	W	Cave C	S	X	X	X				X	Widespread	P	I
Silver-Haired Bat *Lasionycteris noctivagans*	S	J2, S/M BT	SSU	Common	W		S		X		X	X	X	X	Patchy	P	I
Hoary Bat *Lasiurus cinereus*	S	J2		Uncommon	W			X	X	X	X		X	X	Patchy	P	I
California Myotis *Myotis californicus*	S			Common	W	Cave C	S	X	X	X	X	X	X	X	Widespread	P	I
Long-Eared Myotis *Myotis evotis*	S	J2, S/M BT	SSU	Common	W		S	X	X			X	X	X	Patchy	P	I
Little Brown Myotis *Myotis lucifugus*	S			Common	W	Cave	S	X	X	X	X		X	X	Widespread	P	I
Fringed Myotis *Myotis thysanodes*	S	J2, S/M BS	SSV	Rare	W	Cave C	S	X	X	X	X	X	X	X	Patchy	P	I

	Species					Habitat Characteristics										Current Conditions	
							Special Habitats				Seral Stages						
Common/Latin Name	**Presence**	**Status Federal**	**Status State**	**Relative Abundance**	**Distribution**	**Cliff(C) Talus (T)**	**Snags/ CWM**	**Riparian/ Wetland**	**Hardwood Forest**	**Early**	**Mid**	**Late**	**Mature**	**Old-Growth**	**Habitat Distribution**	**Habitat Condition**	**Habitat Trend**
MAMMALS (CONT.)																	
Long-Legged Myotis		J2 S/M				Cave											
Myotis volans	S	BT	SSU	Common	W	C	S	X	X		X	X		X	Patchy	P	I
Yuma Myotis						Cave											
Myotis yumanensis	S	BT	SSU	Common	W	C	S	X	X	X			X	X	Widespread	P	I
Pacific Western Big-Eared Bat																	
Corynorhinus townsendii		PB				Cave											
townsendii[5]	S	BS	SSC	Rare	W			X	X	X	X	X	X	X	Patchy	P	D
American Marten		J2					S										
Martes americana	S	BA	SSV	Rare	W		CWM						X	X	Patchy	P	I
Fisher		J2					S										
Martes pennanti	S	BS	SSC	Rare	W	T	CWM						X	X	Patchy	P	I
Red Tree Vole		J2															
Arborimus longicaudus	S	S/M		Rare	L							X	X	X	Patchy	G	I
White-footed Vole																	
Arborimus albipes	S	BS	SSU	Rare	L		CWM	X					X		Patchy	U	U
MOLLUSKS																	
Oregon Megomphix		S/M															
Megomphix hemphilli	K	J2		Rare	L		CWM	X	X			X	X	X	Patchy	U	I
Blue-gray Tail-dropper		S/M															
Prophysaon coeruleum	K	J2		Rare	L		CWM	X	X			X	X	X	Patchy	U	I
Papillose Tail-dropper		S/M															
Prophysaon dubium	K	J2		Rare	L	T	CWM	X	X			X	X	X	Patchy	U	I

[1] Presence in the analysis area: S - Suspected, but has not been documented. K - Known (most sightings documented in Resource Area files).

[2] Status Federal: FE - Federally Endangered. FT - Federally Threatened. FC - Federal Candidate. BS - Bureau Sensitive. BT - Bureau Tracking. BA - Bureau Assessment. S/M - Survey and Manage. PB - Protection Buffer.

[3] Status State: SE - State Endangered. ST - State Threatened. SSC - State Sensitive- Critical. SSV - State Sensitive/Vulnerable. SSP - State Sensitive/Peripheral or Naturally Rare. SSU - State Sensitive/Undetermined.

[4] Distribution: L - Local. W - Wide.

[5] Habitat Condition: G - Good. F - Fair. P - Poor. U - Unknown.

[6] Habitat Trend: I - Increasing. S - Stable. D - Decreasing. U - Unknown.

Sources: Brown et. al. (1985), Coos Bay District PRMP (1994), FEMAT (1993), Holthausen et al. (1994), Maser et al. (1981), Marshall et al. (1996), Thomas et al. (1993). Distribution, Relative Abundance, and Trend rating for some of the species were from Thomas et al. (1993) and Holthausen et al. (1994).

Table WL-1: Species of Consideration for the South Fork Coos Watershed.

Species of Consideration:

Aquatic amphibians: This group includes the southern torrent salamander, tailed frog, and red-legged frog. These species are associated predominantly with aquatic and riparian habitats. Southern torrent salamanders are found in cool rocky streams and seeps associated with conifer or alder forests (Csuti *et al.* 1997). Tailed frogs require cold, fast-flowing permanent streams in forested areas. These species are dependent on continuous access to cold water and therefore are very sensitive to timber harvest or other ground disturbing activities that may raise water temperature or increase sedimentation. Foothill yellow-legged frogs are generally found in permanent slow-flowing streams with rocky bottoms and stream-side vegetation (Csuti *et al.* 1997). Red-legged frogs occur in marshes, ponds, and streams with little or no flow, and are often found in dense stands of hardwoods with heavy ground cover (Marshall *et al.* 1996). Southern torrent salamanders and red-legged frogs have been found in the Watershed. The habitat condition for aquatic amphibians is rated as fair on Federal land due to the widths of pre-existing riparian buffers. The trend on Federal land is increasing, due to the riparian buffers widths of the Northwest Forest Plan. Restoration activities including the installation of fish-passage culverts that also allow for amphibian movements through them are also a factor in the increasing trend. For the frogs, the habitat trend is increasing but population numbers are declining due to unexplained factors (Marshall *et al.* 1996 and Csuti *et al.* 1997).

Clouded salamander: Clouded salamanders are found in upland habitats in association with down logs. Due to past timber harvest practices and salvage, the habitat condition is poor for the clouded salamander. Coarse woody debris levels on Federal land will increase under the Forest Plan, so there is an increasing trend. The trend could change to stable or decreasing if salvage on Federal land decreases log levels below the minimal standards set in the ROD/ S&G (USDA; USDI 1994, pg. C-40) for Matrix, or if salvage in the Riparian Reserve or LSR decreases log levels below those recommended in the LSR Assessment (USDI; USDA 1998).

Northern spotted owl: There are 24 known northern spotted owl sites within the South Fork Coos Watershed on BLM land (WL Appendix-B: Northern Spotted Owl). Other spotted owl sites are present on private lands within the Watershed. All the BLM sites are pair sites and most are in the LSR. Suitable habitat levels for these 24 pair sites vary but all are below the 40% suitable level used by the U.S. Fish and Wildlife Service as a measure of site viability (WL Appendix-B: Northern Spotted Owl). Generally, pair sites in the GFMA and in Connectivity blocks have lower suitable habitat levels than sites in LSR.

Five spotted owl sites are on GFMA and Connectivity lands in the Watershed. Additional reserve areas designated for these sites, as required by the NWFP. Most of these reserve areas are in the east portion of the Watershed. About 505 acres in the GFMA and Connectivity are reserved for these 5 spotted owl sites. These sites will be managed the same as LSR lands.

There are about 13,517 acres of suitable spotted owl nesting/ foraging habitat (based on acres of stands 81-years old and older) on BLM land within the South Fork Coos Watershed. Most of the suitable habitat occurs in the LSR part of the Watershed (WL Appendix-A: Acres by Stand Type by Drainage). Of the BLM acres in the Watershed, about 20,714 acres have been designated by the U.S. Fish and Wildlife Service as critical habitat for the spotted owl (USDI 1992). These critical habitat acres occur in parts of Critical Habitat Units OR-60 and OR-61 (USDI 1992). The South Coast-Northern Klamath Late-Successional Reserve Assessment (USDI; USDA 1998) contains an analysis of the LSR conditions (LSR 261) for the spotted owls. WL Appendix - B: Northern Spotted Owl Habitat contains an analysis of all suitable spotted owl habitat (dispersal and nesting/roosting/foraging) in the Watershed. That analysis used 1993 LANSAT satellite imagery, which was reclassed based on crown closure, and average stand dbh. The results of that analysis are displayed in WL Appendix-B Map 1.

Approximately 56% (18,389 acres) of Federal lands in the Watershed support stands that are 40-years old and older and classified as dispersal habitat. Dispersal habitat is increasing in trend. The 8,046 acres of young stands (0-39 years of age) in the LSR will reach dispersal function within 40 years. During that same time, up to 1,667 acres of GFMA that are older than 60-years of age could potentially be harvested. There may also be some harvest activities in the Connectivity blocks, but it would be on a small scale. In addition, young stands in the GFMA (563 acres) and Connectivity (360 acres) will also contribute to dispersal habitat once they attain dispersal characteristics. Acreage amounts for these calculations were from Table ACS-1.

Weyerhaeuser is the major private land owner in this analysis area. According to Weyerhaeuser's Habitat Conservation Plan (Beak Consultants Inc. 1994), by the year 2044, 40% of the Tree Farm will provide roosting and foraging habitat for the owl and will continue to provide suitable habitat at least through the end of their 50-year plan. The Tree Farm will provide dispersal habitat between the Federal LSRs to the north and south, and to the Elliot State Forest. Under current plans, Weyerhaeuser will be managing for a general landscape condition of suitable dispersal habitat, rather than for distinct corridors. Dispersal habitat is important because the potential for local extinction increases if the species becomes isolated.

Marbled murrelet: There are 9 occupied marbled murrelet sites in the South Fork Coos Watershed on BLM lands. Eight of these are in the GFMA and Connectivity blocks, and 1 site is in LSR. Murrelets probably occupy additional sites in the LSR, however those locations are not known because survey efforts have been directed at GFMA lands. Other occupied murrelet sites are present in the Watershed on private lands.

There are 10,359 acres of marbled murrelet suitable habitat on BLM lands in the South Fork Coos Watershed. Most of this occurs in the LSR portion of the Watershed. Of the BLM acres in the Watershed about 20,767 acres have been designated by the U.S. Fish and Wildlife Service as critical habitat for the marbled murrelet (USFWS 1997). These critical habitat acres occur in parts of Critical Habitat Units OR-04-e, OR-06-b, OR-06-d and OR-06-e (USFWS 1997). Within the Watershed the acres of Federal land designated as critical habitat are the same as the LSR acres. Current habitat conditions for the marbled murrelet in the LSR part of the Watershed is provided in the South Coast-Northern Klamath Late-Successional Reserve Assessment (USDI; USDA 1998).

Bald eagle: There are 4 known bald eagle nest sites in the South Fork Coos Watershed and these are all part of one bald eagle territory (Isaacs; Anthony 1997). All the nest sites are on private land in the northwest part of the Watershed. Bald eagles probably nested historically along all the larger rivers in the Watershed but recent nesting was not documented until 1994 (Isaacs; Anthony 1997). It appears that bald eagles are expanding back into their historic nesting range within the Watershed and this trend should continue.

Eagles typically nest in the largest, most dominant Douglas-fir tree within a conifer stand. Live canopies usually cover the nest, and nests are located within the top 20 feet of the tree. Nests usually provide an unobstructed view of water, and are usually within 0.5 miles of open water. In an Oregon study, Isaacs *et al.* (1983) reported that 85% of the bald eagle nests were within 1 mile of major bodies of water. Snags and trees with exposed lateral limbs are important for perching. Refer to the Bald Eagle Recovery Plan (USFWS 1986) for further discussion of species abundance, distribution, and habitat characteristics.

The habitat condition is fair as most of the timbered stands within the birds' nesting range have been harvested. There is not much Federal ownership along the South Fork Coos River system, but what is there includes suitable habitat for nesting. Due to the Bald Eagle Recovery Plan, the trend is stable on

Federal land, and could even increase in the Watershed if habitat enhancement projects or land acquisitions are completed for bald eagle habitat.

American peregrine falcon: American peregrine falcons nest on sheer cliffs ranging in height from 75 to 2,000 feet. Peregrines prefer sites overlooking open areas associated with water, where waterbirds are common. Eyries are located at 40-80% of total cliff height on sheer faces and are usually inaccessible to mammalian predators. Most eyrie cliffs in Oregon are 0.25 to 0.50 miles from riparian, lacustrine, or marine habitat, although farther distances (up to one mile) have been reported elsewhere. There are no known eyries in the analysis area. Possible sites would be in the rock bands along the South Fork Coos River. Population density is most likely limited by nest sites. Peregrines will defend an area from 100 yards to one mile from nest sites depending on the associated features. A home range can be from 25 to 100 square miles in size. The American peregrine falcon was de-listed under the Endangered Species Act on August 25, 1999. Following de-listing a species is designated as a Bureau Sensitive species and will be re-evaluated at the end of a five-year monitoring period.

Northern goshawk: Northern goshawks may be present in the eastern portion of the Watershed. Surveys are not required for lands within the range of the northern spotted owl; however they are recommended (BLM Instruction Memorandum OR-98-12, expires 9/30/99). Northern goshawks are a Federal Species of Concern and an Oregon State status of Sensitive. Nests have been found in the Coast Range by the Roseburg BLM and the analysis area contains suitable nesting habitat. This species prefers large patches of late-successional forests with large trees and considerable canopy closure (Csuti *et al.* 1997).

Pileated woodpecker: Pileated woodpeckers require late-successional forest habitat that contain hard snags greater than 25" dbh (Brown *et al.* 1985). Plieated woodpeckers feed primarily on carpenter ants, but will opportunistically feed on other arthropods (Bull *et al.* 1992). This bird is designated as a management indicator species for mature and old-growth forest on national forests in Oregon (Marshall *et al.* 1996) and will be used as a representative of the snag-dependent species for this Watershed. The habitat condition for snag- dependent species is poor. The trend is upward due to the snag standard and guidelines for the Matrix and LSR Assessment guidelines, including snag creation contracts in the LSR. There will be a loss of large trees in the GFMA (that could potentially turn into snags), but existing snags and designated wildlife trees will provide future snag habitat.

A host of secondary cavity nesting species use pileated woodpecker nest cavities. The northern pygmy owl is one of those species, and it is listed as sensitive due to their dependence upon woodpeckers to create secondary nesting cavities (Marshall *et al.* 1996). Besides their dependence on cavities, there is a lack of information on the ecology of the owl. Additional studies are needed to gain better insight into habitat management for the pygmy owl.

Bats: The 11 bat species that could occur in the Watershed are associated with a variety of habitat structures. Bats roost in buildings, bridges, rock crevices, tree cavities or foliage, and loose tree bark. Old growth forests provide higher quality roost sites than younger forests (Christy; West 1993). Foraging areas include the forest and forest openings, riparian areas, and open water. Rock bluffs, hollow trees and snags, and deeply fissured or loose bark may offer roosting crevices for bats. The thick bark of older trees, and bark and cavities in snags provide high quality habitat. Bat species listed as Federal Species of Concern, which could occur in the Watershed area, include the Yuma myotis, long-legged myotis, fringed myotis, long-eared myotis, and Pacific western big-eared bat (Csuti *et al.* 1997).

No caves, mines, or abandoned wooden bridges or buildings have been identified in the Watershed that could be providing bat habitat and would require additional protection ROD/S&G (USDA; USDI 1994, pg. C-43). Species that would be included under this protection, if such sites are found, and that could

occur in the area are fringed myotis, silver-haired bat, long-eared myotis, long-legged myotis, pallid bat and Pacific western big-eared bat.

There has been a one-time survey of bat use on BLM-controlled bridges in the Coos Bay District. Four bridges in the Watershed showed signs of night roosting by bats, but there were no signs of use as day roosts, nursery roosts or hibernaculums (Keeley 1998). The locations of these sites are in the recommendation section). One factor in the use of these bridges for day roosts, nursery roosts or hibernacululms is the bridge's exposure to sunlight, and their ability to absorb and retain heat. Bats are very sensitive to small changes in temperature and require warm roosts. Bats in nursery sites preferred temperatures between 80 F and 100 F, so solar radiation would be needed to increase temperatures in these structures (Tuttle; Hensley 1993).

The factors listed for the condition trend for the pileated woodpecker also account for the upward trend for bat species that use snags as primary habitat. The hoary bat only uses large, live trees for roosting. The trend for the hoary bat will improve due to the NWFP and the designation of LSR #261 and Riparian Reserves, and retention of snags and wildlife trees in the Matrix. The Pacific western big-eared bat's habitat condition is in decline mainly due to human harassment and destruction to caves and other structures used for roosting, hibernaculum, and nursery sites.

American marten and fisher: The clumps of late-successional forest in the Watershed (especially the Tioga Creek Subwatershed) are providing suitable habitat for the American marten and possibly the fisher. Martens are typically associated with large, contiguous blocks of late-successional forest habitat that contain riparian areas and abundant down logs and snags (Buskirk *et al.* 1994). The snags and down wood in these late-successional stands would provide the structure required by the marten. The limiting factor would be the amount of contiguous suitable habitat within a home range for these two species. The marten's normal home range is 1 square mile though they may range as far as 15 miles. The fisher's normal home range is 10 square miles.

Fragmentation of late-successional forests, the loss of large downed wood, and human disturbance all contribute to the poor habitat condition for the marten and fisher. The trend is upward, as over time, management in LSR #261may provide a large enough block of suitable habitat.

Red tree vole: Red tree voles are arboreal rodents that occur in patchy distributions primarily in late-successional forests (Huff *et al.* 1992). Red tree voles are most commonly found in Douglas-fir stands, though they are occasionally found in grand fir, Sitka spruce, and western hemlock. They have been found in all Douglas-fir forest age classes, but tend to be more abundant in mature and old-growth forests (BLM Instruction Memorandum No. OR-97-009 dated Nov. 4, 1996). Ongoing surveys throughout the range of the red tree vole will provide additional information on red tree vole distribution and habitat requirements. Regional surveys are currently in progress in various age classes of forests. Preliminary data indicate that the Coos Bay District may be an area of higher numbers of red tree voles than other areas and may be near the center of the species' range. Although current data indicates that red tree voles are also found in younger stands, larger numbers of nests are found in late-successional stands (Brian Biswell, pers. comm.). Red tree voles are present in the Watershed, and more sites are likely to be documented as surveys are planned to take place before all habitat-disturbing activities. There are about 18,078 acres of BLM lands within the Watershed with Douglas fir stands $\geq$ 40 years old, which is generally considered suitable habitat for this species.

White-footed vole: The white-footed vole inhabits riparian areas, particularly along small streams with an alder forest component (Maser *et al.* 1981). White-footed voles are susceptible to habitat loss and fragmentation. More specific information is lacking on the species habitat requirements (Marshall *et al.*

1996) and so the habitat condition and trend are unknown. One action that will reduce the species habitat is removal of hardwoods from historically hardwood-dominated riparian areas.

Mollusks: Surveys for three species of terrestrial mollusks in this Watershed formerly were required before ground-disturbing activities. The species are the Oregon Megomphix, blue-grey tail-dropper, and papillose tail-dropper. As a result of recent amendments to the survey and manage guidelines, surveys for these mollusks are no longer required. However, the amended survey and manage guidelines do require managing known Oregon Megomphix sites (USDA; USDI 2001).

Key habitat components for Survey and Manage mollusks vary among species. Suitable habitat for Oregon Megomphix includes moist conifer or conifer/hardwood (bigleaf maple) mixed forests up to 3,000 feet in elevation. A key habitat component is leaf litter under large bigleaf maples, near down logs, or beneath sword ferns. Habitat for both tail-dropper species includes conifer forests, typically with a hardwood component. The key habitat components for these species are conifer and hardwood logs, ground litter and mosses, and leaf litter under shrubs. The papillose tail-dropper is also associated with talus slopes.

Species of Local Concern:

Del Norte salamander: Del Norte salamanders are found primarily in forested (mixed conifer-hardwood) talus habitat. Suitable sites contain deep cobble-sized talus with interstitial spaces sufficient to allow them to retreat far below the surface rock to escape temperature extremes and drying. In forested areas, they can be found in surface duff or under rocks and sloughed bark. They also may be found where deep talus is abundant although canopy cover is lacking. A portion of the watershed is within a 25 mile-radius of the northernmost known Del Norte salamander location, and therefore was subject to predisturbance surveys under the old survey protocol. As a result of recent amendments to the survey and manage guidelines, surveys for the Del Norte salamander are no longer required before ground disturbing activities (USDA; USDI 20001).

Birds: Approximately 68 species of neotropical migratory birds are suspected to occur in the analysis area (USDI 1994 Appendix T). These species are highly correlated with riparian and forested habitats. It is believed that populations of the neotropical migratory birds are experiencing a decline throughout North America. The decline in bird species that are closely associated with late-successional forests may be caused by habitat loss, competition for habitat components, and increased predation. Though they are not specifically addressed in this document, neotropical migratory birds should be considered when forming management recommendations.

There are known Cooper's hawk nest sites on BLM land in the analysis area. The ROD/RMP requires a 15-acre management area around known nests (USDI 1995, pg. 29). This species is associated with a coniferous forest but can be found in mixed and deciduous stands.

Band-tailed pigeons use a variety of forest habitats and feed primarily on berries and nuts. They occur in low numbers and seem to have experienced a general population decline from the mid 1960s to the late 1980s (Jarvis; Passmore 1992). Declines throughout their range may be due to reduced forage, mineral sites and nesting habitat, and increased pressure from agricultural interests and hunting on their winter ranges. No formal surveys for this species have been conducted.

Beavers: The stream system and plant communities should provide good habitat for beavers. Beavers are commonly found in areas with relatively constant water levels that have an adequate flow for damming. Other wildlife species benefit from beaver dams from an increase in standing water, edge, and riparian plant diversity. Dams also hold water back for a longer time during the summer, hence

improving conditions for fish. Increases in water storage, streamflow stabilization, and elevated water tables are also a benefit of beaver dams.

Confidence level for the ratings of habitat condition and trend: The ratings were based mainly on expended habitat trends under the NWFP and professional judgement, and the confidence level is good. Trends for some species were based on reports in Thomas *et al.* (1993) and Holthausen *et al.* (1994). The assumption for all nonfederal land was that forested areas would follow the minimum requirements under the Forestry Practices Act, and that restoration of late-successional habitat would not be a part of the management strategy. It was also assumed that the bottomlands and gentle slopes would continue to be managed for agriculture and rural housing.

Snags: The habitat condition for snag-dependent species is poor. This rating reflects past harvest practices, and road-side snag felling contracts. Potential snags have also been removed from the managed stands through silvicultural practices. Wildlife tree retention was not required until 1983 on BLM and 1991 on private. The majority of BLM land had been harvested before this policy was implemented. Pre-harvest surveys for snags have been conducted on 7 GFMA units within this Watershed (Table WL-2). Without a more representative sample, it is hard to know if the Matrix portion of the analysis area would meet the requirement for retaining snags sufficient to support species of cavity-nesting birds at 40% of potential population levels (1.5 snags/acres) as required by the District ROD/RMP (USDI 1995, pg. 27). This level is low compared with that needed to support 100% of potential population levels (3.8 snags/acre) (Marcot 1991).

The trend is upward due to snag standard and guidelines for the Matrix (USDI 1995), and LSR Assessment (USDI; USDA 1998) guidelines including snag creation projects in the LSR. The RMP's (USDI 1995) Management Direction of meeting the 40% levels throughout the Matrix with per acre requirements met on average areas no larger than 40-acres will also contribute to the increasing trend in snag numbers. WL Appendix-D: Snag Management on Matrix Land includes discussions on management for snag habitat. There will be a loss of large trees in the GFMA (that could potentially turn into snags), but existing snags and designated wildlife trees will provide future snag habitat.

Coarse Woody Debris (CWD) Outside the LSR: Pre-harvest surveys for decay class I and II CWD had been done on 7 Matrix units within this Watershed (Table WL-2). The 3 regeneration harvest units sampled have sufficient (CWD) on the ground to meet the ROD/RMP standard of 120 lineal feet of decay class I and II material at least 16 feet long and at least 16 inches on the large end. The 4 commercial thinning units do not have existing levels of decay class I and II CWD set as a standard for regeneration harvest units on Matrix land. The ROD/RMP standards and guidelines for partial harvest areas in the Matrix is to "apply the same basic management actions/directions [used for regeneration harvest], but they can be modified to reflect the timing of stand development cycles where partial harvest is practiced" (USDI 1995, pg 22). The commercial thinning units were from 29-years old to 35-years old at the time CWD surveys were done. Given their age, the commercial thinning units are unlikely to produce, through natural mortality, the diameter classes of decay I and II CWD needed to meet ROD/RMP standards for regeneration harvest units for at least another 20 years (see the Density Management and attaining Riparian Reserve Function Section in this document). This limited set of surveys in proposed commercial thinning/ density management units shows the total average cubic feet/ acre of CWD in mid seral managed stands to exceed levels observed by Spies and Franklin (1991) in mature and old-growth stands (Tables CWD-1, 2, and 3 in WL Appendix-C: Coarse Woody Debris). The cubic foot volumes of decay class II logs observed in 3 of the 4 sets of transects are within the range Spies and Franklin (1991) observed for natural stands 80 to 195-years old. The volume of decay class II logs observed in the fourth set of transects is consistent with a natural stands that are 40 to 80-years old. Figure 1 in this chapter shows slash amounts left in the ground following logging in 1950, which

contributed to CWD levels currently present in the second growth stands.

Table WL-2: Snag and Coarse Woody Debris Survey Results for Matrix Units.

Survey Area	Legal (T-R-Sect)	Acres	Pre-harvest Snag Density (snags/ac) [1]	Pre-harvest Log Length (lineal feet/ac ≥16 inches diameter, measured on the large end), Class I & II only [2] using a 100% survey method	Pre-harvest Log Length (feet/ac ≥16 inches diameter, measured on the small end), Class I & II only [3] using a transect method	Pre-harvest Log Length (feet/ac 5 to 15 inches diameter, measured on the small end), Class I & II only [3] using a transect method
Bear Gulch Regen. #1	27-9-24	1	3.3	199	No data collected	No data collected
Beyer's Deadhorse Regen #2	27-9-24	59	5.1	No data collected	No data collected	No data collected
Beyer's Deadhorse Regen #3	27-9-26	1	3.0	No data collected	No data collected	No data collected
Beyer's Deadhorse Regen #5	27-9-24	10	1.9	No data collected	No data collected	No data collected
Green Cedar Regen. #1	26-8-22	18	4.9	242	No data collected	No data collected
Green Cedar Regen. #4	26-8-22	9	9.2	537	No data collected	No data collected
Dead Horse CT #2	27-9-23	50	0.42	8	0	311
Beyer's Way CT	27-9-15&22	180	No data collected	No data collected	0	109
Burnt Mtn. CT	27-9-23	22	No data collected	No data collected	0	456
North Tioga CT	27-9-10	41	No data collected	No data collected	0	342

1 Includes snags equal and greater than 11" dbh and 10 ft. high in all decay classes. 100% of the unit was surveyed. Monitoring Plan for Wildlife Trees and Snags (USDI 1997)

2 Decay class I & II down wood, 16" or greater diameter at the large end and 16' or longer in length. 100% of the unit was surveyed. Down Log Monitoring Plan (USDI 1998)

3 Decay class I & II wood. Down wood length 8' or longer. Units surveyed using transects. Transects procedures in the H-5250-1 Forest Survey Handbook - BLM Manual Supplement State Office Rel. 5-244.

Spies *et al.* (1988) observed that woody debris distribution in young stands is concentrated in decay classes III, IV and V. In mature stands, the woody debris is more evenly distributed among decay classes II through V. In old-growth, the woody debris is concentrated in decay classes II and III. The CWD surveys in the mid seral stands in the Matrix part of this Watershed show the woody debris volumes concentrated in decay class IV (5,909 to 8,200 cubic feet/ acre), followed by decay class V (179 to 658 cubic feet/ acre). The amounts of decay class III were highly variable (0 to 703 cubic feet/ acre). Decay class II ranged from 21 to 100 cubic feet/ acre. The transects did not intercept any decay class I material. This analysis is in WL Appendix -C, Table CWD-2.

Coarse Woody Debris Inside the LSR: CWD transects were completed and analyzed for 32 stands inside the LSR part of the Watershed in 1999. These CWD transect data are summarized on Table CWD-7 and Table CWD-8 in Wildlife Appendix-C: Coarse Wood Debris.

Eighteen of these stands are less than 40-years old and were all regenerated following logging. Twelve of those

Figure 1: Slash resulting from a clearcut harvest about 1950 in section 13, T.26S., R.10W. (Hatcher Creek Area)

stands had decay class II CWD amounts that are within or exceed the range documented for 40 to 80-year old natural stands by Spies and Franklin (1991). Fifteen of those stands had total CWD amounts that are within or exceed the range documented for 40 to 80-year old natural stands.

Fourteen of the stands are older than 40-years and 10 are of natural origin. Two of the 4 stands that regenerated following logging have total CWD levels that within or exceed the range of CWD observed by Spies and Franklin in natural stands. Three of the 10 natural stands surveyed had total CWD amounts that were within or exceeded the natural range documented by Spies and Franklin. The lower total amounts of CWD observed in natural stands in this Watershed, compared to the stands sampled by Spies and Franklin, may be due to sampling standards and/or fire history. The CWD transects in this Watershed tallied CWD that was at least 5-inches in diameter and 8-feet long. Spies and Franklin tallied all CWD that was at least 4 inches in diameter with no minimum length standard. Also this Watershed is south of where Spies and Franklin did their work in the Coast Range and thus it is possible that the stands in this Watershed had a higher frequency of fire. Ten out of 14 units surveyed for CWD, which were 40-years old or older, had decay class II levels that were within or exceeded the natural range documented by Spies and Franklin for 40 to 80-year old natural stands.

Connectivity/Diversity Blocks and Dispersal Habitat: The ROD/RMP designated 3,344 acres of Connectivity/Diversity Blocks in this Watershed. Management direction for these blocks is to maintain 25 to 30% of each block in late-successional forest. Riparian Reserves and other allocations with late-successional forests count toward this percentage. Approximately 540 acres inside these blocks are now in Northern Spotted Owl 100-acre core areas, and 1,128 acres are Riparian Reserves or designated as "nonsuitable" in TPCC or otherwise administratively withdrawn. This leaves approximately 903 acres of Connectivity land included in the allowable cut calculations, of which, 373 acres currently support stands 80 years old and older. Of the 24 Connectivity/ Diversity Blocks in the Umpqua Resource Area, 11 meet the 25 to 30% requirement for late-successional forest, and 7 of these are in this Watershed. Table WL-3 shows the percentage of each Connectivity/Diversity Block in late-successional forest.

Table WL-3: Connectivity Blocks and Acreage More Than 80-Years of Age Based on 1995 Land Use Allocations.

Connectivity/ Diversity Block No.:	Name	Legal	Forest acres	Acres of Late-Successional Stands (Age 80-years old and older)	Percent of block older than 80-years of age
17	Coos River	T.25S., R.10W., sec. 29	167	88	53%
18	Callahan Ridge	T.26S., R.8W., sec. 20	476	309	65%
19	Skip Creek	T.25S., R.9W., sec. 34 T.26S., R.9W., sec. 2	285	167	59%
20	Williams River	T.26S., R.9W., sec. 12, & 14	358	187	52%
21	Morgan Ridge	T.26S., R.12W., sec. 1, & 2 T.26S., R.11W., sec. 6	665	526	79%
22	Ren Smith	T.26S., R.12W., sec. 2, 11, & 12	906	462	51%
23	Renfro Creek	T.27S., R.8W., sec. 4	487	256	53%
	Total		3,344	1,995	60%

Road Densities: The BLM controls 185 miles of road in the Watershed with an average density of 3.6 miles per square mile (Table ACS-2). BLM lands in this analysis area are within Oregon Department of Fish and Wildlife's Tioga Big Game Unit. The RMP's goal for road density within the Tioga Big Game Unit is to maintain 1.1 miles of road per section per watershed with a maximum density of 2.9 miles per section per watershed (USDI 1995, pg.29).

Reference Condition

Information on the historical distribution of individual wildlife species can be found in identification guides (Burt and Grossenheider 1980; National Geographic Society 1983; Leonard *et al.* 1993). These maps and accounts show the geographic distribution at a large scale, but suitable habitat must be present within the range in order for the species to be present.

Historically, the area had a mosaic of wetland and riparian habitats along the river's flood plain (see Map Veg-1) with a mixture of seral stages in the forested uplands. The reference condition section of the Vegetation Chapter describes the premanagement condition of the forest and other habitats in the Watershed. The key disturbance processes would have been flooding along the valley bottoms, landslides and debris torrents along stream channels, windthrow in forested areas, and fire across the landscape.

There would have been a higher abundance of riparian-associated species as the Coos River and its tributaries would have provided flood plains, wetlands, and forested riparian areas that would have been used by a host of wildlife species. For example, the willow communities would have supported more beaver families than exist currently.

The late-successional forest associated species of concern were more abundant and had greater distribution. Raptor nesting and perching sites would have been more common due to the presence of scattered, large Douglas-firs that owe their open grown condition to past fires. The fire history in the late-successional stands would also have produced a greater number of snags in various decay classes, which would have increased the habitat availability and abundance of cavity and snag-related species (14 of the species of consideration). Large Douglas-firs would have provided a high volume of downed wood. This would have provided abundant habitat for terrestrial amphibians, furbearers, and mollusks. Fire charring of the downed wood would have been variable, depending on the microclimate and topography near the downed wood, and the fire pattern and intensity. Late-successional forests would have provided optimal cover for big game, while foraging areas would have been present in recently burned areas. Areas of repeated burns would have provided seral habitats. The forest structure would have provided quality foraging and dispersal areas for the northern spotted owl.

The distribution of early, mid-seral, old-growth, and climax habitats in this watershed likely were rarely if ever in equilibrium (Sprugel 1991). Rather the watershed at any given time was dominated by either early-seral or mid-seral or old-growth habitat with pockets, patches and stringers of the less common habitats providing refuges for species depended on what ever habitats were uncommon at the time. Moist protected north slope, lower slope and stream side areas provided the refuge habitats for late-successional/ old-growth dependent species during those periods when early or mid-seral forests dominated the Watershed following stand replacement fires. Also during those times, the early and mid-seral stands contained scattered older large green trees, abundant large snags and large down wood. These late-successional stand attributes, in stands dominated by early and mid-seral trees, allowed late-successional forest associated species to survive, disburse and perpetuate in those parts of the watershed that lacked remnant old-growth stands (North *et. al* 1999). Shallow soil rockland areas and fire maintained prairies provided refuges for early seral species during those periods when mature and old-growth stands dominated the Watershed. Disturbance prone upper slopes, ridges, and landslide tracks provided refuge habitats for species associated with edge habitats (Erosion and Vegetation sections, Fire History Appendix). Fires set by Native-Americans may have benefitted local populations of species associated with early seral conditions and edge habitats during periods when late-successional/ old-growth forests dominated the landscape (LaLande; Pullen (1999). While we commonly associate large snags and CWD with late-successional/ old-growth habitat and we consider the presence of these structures in early and mid-seral forest as important as refuges for late-successional species, these large

structural elements also provide necessary habitats for some species associated with early and mid-seral conditions (Hutto 1995).

Synthesis and Interpretation

Table WL-4 lists the causes of change between historic and current species distribution and habitat quality for species of consideration in the analysis area. Timber harvest, and agricultural/rural housing activities (converting forest/wetland to pastures, ditching/diking) have replaced natural disturbances. The closeness of the western section to Coos Bay increases human presence (including harassment, back road driving, poaching, and garbage dumping) and wildlife disturbance in this area. This may cause the absence of many wildlife species that would have normally occupied various seral stages. Management activities have also provided conditions favorable for non-native species like bullfrogs, European starlings and noxious weeds allowing these introduced to expand their range at the expense of native species.

Table WL-4: Causes of Change Between Historical and Current Species Distribution and Habitat Quality.

Species of Consideration	Change	Primary Cause
Aquatic Amphibians	- Decrease of cold clear stream habitat	- Timber harvest practices
	- Increase in fine sedimentation	- "
	- Higher stream temperature	- "
	- Increase in dispersal barriers	- Culverts, road construction
Terrestrial Amphibians	- Loss of large diameter CWM	- Timber harvest practices
		- Salvage
Northern Spotted Owl Marbled Murrelet Northern Goshawk	- Loss of late-successional habitat	- Timber harvest of late-successional habitats
Northern Spotted Owl	- Loss/fragmentation of dispersal habitat	- Timber harvest
Cavity Nesting Species & Bats	- Loss of snags	- Timber harvest & conversion of land to agriculture/residential
	- Loss of older seral stages	- "
	- Interruption of snag legacy	- Thinning from below, timber harvest
Bald Eagle	- Loss of nest trees	- Timber harvest/ road construction
	- Loss of potential nest sites	- Harvest on private/public land within 1 mile of large rivers.
	- Interruption of nesting	- Man-made disturbances within line of sight of the nest tree
	- Unsuccessful nesting	- Pesticides
American Marten and Fisher	- Loss and fragmentation of late-successional habitat	- Timber harvest
	- Degradation of riparian habitat	- "
	- Loss of CWM and snags that are used for hiding/resting/denning	- "
	- Increased human disturbance	- Road construction
White-footed Vole and Mollusks	- Loss of natural alder riparian areas	- Timber harvest methods
		- Inadequate riparian buffers
Big Game	- Human harassment and poaching	- Construction of roads and spurs
	- Loss of thermal and hiding cover	- Timber harvest
	- Loss of calving areas	- "
All Species	- Loss of vegetative & structural diversity	- Planting Douglas-fir monocultures, PCT, brush/hardwood removal

The species most affected are those requiring old-growth forest habitats, or habitat complexity (snags, down wood, complex tree canopies, *etc.*) Population numbers of these animal species have declined, and many are restricted to small isolated habitat islands due to a loss of habitat connectivity.

Snags: It is important to note that the primary excavator bird species have minimum snag diameters and

states of decay requirements that must be met in addition to the number of snags on the landscape. For example, retaining 3 or 4 or more snags per acre following a timber harvest would not meet the 40% population objective if all those snags were decay class 4 or 5 (WL Appendix-D: Snag Management on Matrix Land). The longevity of a snag is also a factor in evaluating if the snag requirements have been met for the "near-term (less than 3 decades)"(USDI 1995). This is because the hard snags smaller than 18.8-inches dbh will transition to soft snags before the new stand can produce replacement snags meeting the minimum size required by most of the primary excavator species (WL Appendix-D: Snag Management on Matrix Land).

Coarse Woody Debris: The decay class II levels reported by researchers may be misleading if taken at face value and the tendency for tree mortality to occur in pulses or waves is not considered. Therefore, local "shortages" or "excess amounts" may be normal in natural stands. The CWD analysis in WL Appendix-C showed the sampling of mid seral managed stands meeting or exceeding total levels of CWD typical for late-succession and old-growth natural stands. However, some stands appear to be short on decay class II and III CWD. This uneven distribution needs to be taken into account when assessing if there is a surplus of CWD in a stand. Decay class I logs need to be "fed" into the system to eventually get decay class II and III CWD. The greatest pulse input of CWD is associated with catastrophic events. To insure that there will be sufficient decay class III, IV and V logs in the future, we will need to retain abundant levels of decay class I and II logs on site following catastrophic events in areas managed for late-successional habitat. This will need to be taken into account if salvaging is prescribed due to a catastrophic event in LSR #261, LSR#263 or the Riparian Reserves. Therefore in the LSR and Riparian Reserve, where we are managing for late successional conditions, the function of a "salvage sale" is not to recoup economic loss but rather to facilitate rapid regeneration by opening sufficient plantable spots, and to reduce the risk of additional loss of forests by breaking fuel continuity and the possible spread of insect epidemics consistent with retaining a snag and CWD legacy.

Butts and McComb (2000), found numbers of ensatina salamander numbers increased with increased total volume of CWD and clouded salamanders were not observed on sites with low amounts of CWD. Their results suggest that ensatina and clouded salamanders may not persist in managed stands where only the minimum amount of CWD is retained. They suggest managing for CWD levels comparable to amounts found in natural stands would more likely provide for terrestrial salamander CWD habitat requirements with the caveat that total CWD volume alone does not address the size and decay stages preferred by terrestrial salamanders nor the requirements of small mammals that use CWD. Butts and McComb suggest managing for a CWD range of 100-300 m^3/ha (1,429-4,288 ft^3/ ac). The low end of this range corresponds to the average CWD amounts observed in mature stands and the upper end corresponds to that found in old growth (Spies et al 1988; Spies & Franklin 1991).

Landscape Connectivity: Connections between habitat areas are especially important in fragmented landscapes. Habitat connections occur at two scales: connections between large LSRs to facilitate movements of fairly mobile species, and connections between habitat patches to facilitate movements of less mobile species. The Connectivity blocks, with their additional standards and guidelines, are intended to facilitate dispersal of mobile late-successional species across the landscape.

The functions of the Riparian Reserve include ". . . improve travel and dispersal corridors for terrestrial animals and plants, provide greater connectivity of late-successional forests" between LSRs (USDA; USDI 1994, pg. 7). This management direction reflects the value of the Riparian Reserves as connectivity between LSRs and as extensions of late-successional habitat outside the LSR that can function as refuges and source areas for species benefitted by late-successional habitat thereby maintaining their presence in adjacent Matrix and private lands. "The main purpose of the Riparian Reserves is to protect the health of the aquatic system and its dependent species . . ." (USDA; USDI

1994, pg. 7). This purpose is met, in part, by meeting ACS objectives through an appropriate mix of passive and active management. The most sensitive parts of the Riparian Reserve, with respect to the near term benefits provided by the forest vegetation to the aquatic system, are those areas within a zone whose width is equal to the half the average height of the overstory trees (see Table DM-1). Outside that zone, ID Teams have greater flexibility in both meeting ACS objectives, and providing for connectivity and benefitting late-successional associated species.

From a landscape perspective, density management treatments in Riparian Reserves within Matrix lands should be designed to maintain or improve connectivity between LSRs (consistent with ACS objectives). Connectivity links that would be important in this Watershed are those connecting LSR #261 to LSR #263 and LSR #259. In those areas where connectivity between blocks of late-successional habitat is less critical, density management treatments designed to develop late-successional characteristics, tempered by the need to maintain connectivity within the Riparian Reserves, and consistent with meeting ACS objectives, may be more beneficial for late-successional species. Table WL-5 outlines the characteristics to manage for when applying density management in Riparian Reserves.

Table WL-5: Characteristics to Manage for When Applying Density Management in Riparian Reserves

Location (T-R-Sect)	Land Use Allocation for land adjacent to the Riparian Reserve	Species of Consideration	Target Characteristic (consistent with meeting ACS objectives)
Western section of WAU (T.26 S., R.12W.)	GFMA, CON	Marbled Murrelet, Bald Eagle	Late-successional forest
T.25 S., R.10W., sec. 27	GFMA	Marbled Murrelet, Bald Eagle	Late-successional forest
T.25 S., R.11W., sec. 30	GFMA	Marbled Murrelet	Late-successional forest
T.26 S., R.11W., sec. 1	GFMA	Marbled Murrelet, Bald Eagle	Late-successional forest
T.26 S., R.11W., sec. 8	GFMA	Marbled Murrelet	Late-successional forest
T.25 S., R.10W., sec. 29	CON	Marbled Murrelet, Bald Eagle	Late-successional forest
T.26 S., R.9W., sec. 2	CON	Northern Spotted Owl	Connectivity between LSR #261 and #263
T.25 S., R.9W., sec. 34	CON	Northern Spotted Owl	Connectivity between LSR #261 and #263
T.27S., R.9W., sec. 10, 14, 15, 22, 23, 24, 26, 34, & 35	GFMA	Northern Spotted Owl	Connectivity into LSR#261
Riparian Reserves inside the LSR boundaries	LSR	All late-successional related species	Late-successional forest

Riparian Reserves on intermittent streams are particularly important for maintaining connections between habitat patches. They often connect upland and riparian habitats, and together with perennial stream reserves, form continuous corridors through BLM lands.

The standards and guidelines for the Forest Plan provide for habitat for late-successional and old-growth forest related species. Regeneration harvest on Matrix land that is adjacent reserve lands is consistent with the Forest Plan. The Forest Plan is designed so that neither randomly locating Matrix regeneration harvest units nor a bias toward locating regeneration harvest units on Matrix land next to reserves will prevent attainment of the Forest Plan objectives for late-successional/old-growth habitats. However, preferentially scheduling regeneration harvest in the Matrix so that isolated and fragmented Matrix stands are cut first would allow the Matrix stands that are next to reserves to provide a short term unplanned benefit for late-successional/old-growth associated species (Franklin; Forman 1987). The attainment of this higher level of benefit would not be inconsistent with the Forest Plan so long as attaining the additional benefit does not prevent attainment of other Forest Plan objectives, which include economic objectives and benefits for species that use early and mid-seral habitats. Well situated Matrix

stands 40-years of age and older next to reserve lands can augment interior habitat, and reinforce habitat connections in the near term while early and mid-seral stands inside the reserves mature. These benefits could be realized by scheduling regeneration harvests so that isolated Matrix stands are harvested first. In effect, this delays regeneration harvest of Matrix stands adjacent to LSR #261, allowing them to provide late-successional habitat for a time while the reserve stands that are younger than 40-years of age to mature to the point where they can provide connectivity.

Road Densities: Roads increase access for legal or illegal hunting, and vehicle traffic can harass wildlife. Negative affects are particularly well documented for large mammals such as elk (Wisdom *et al.* 1986). Cole *et al.* (1996) noted vehicle traffic on secondary roads was greatest during fall hunting seasons. A telemetry study of elk on a portion of the Coos Bay District (Cole *et al*.1996) found that elk avoided areas within 492 feet of roads, and poaching accounted for 50% of the elk mortality.

The road surface is also a physical barrier to some small-bodied, ground-dwelling wildlife such as small mammals, snails, and butterflies (Bennett 1991 in Gibbs 1998). Small wildlife species may not cross a road bed, even if it is closed to vehicles, due to the change in surrounding conditions (Noss; Cooperrider 1994). This is supported by Gibbs (1998) who reported that amphibians are more likely to move across a forest-to-grass edge than across a forest-to-road edge. Thus, the presence of the road surface or fill could provide an unpassable barrier for amphibians such as the red-backed salamander. In addition, amphibians move shorter distances and have relatively poorer dispersal capabilities than other vertebrates, so a small scale disturbance such as a road can have a large impact on the local population and may limit recolonization capabilities (deMaynadier; Hunter 1995).

Roads can also provide a travel path into interior habitat for edge associated species. Gated roads, which still receive moderate administrative use, or gates left open do little to reduce harassment to wildlife. Minimizing new road construction, decreasing open road density through closures, and fully decommissioning selected roads will decrease disturbance and barriers that affect wildlife.

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